CLAIMS

1. A dynamic gain equalizer comprising:

a spectroscope that separates an incoming light into spectral components;

a liquid crystal optical switch that receives the spectral components separated by said spectroscope; and

a lens system arranged between an incoming end and said spectroscope and/or between said spectroscope and said liquid crystal optical switch,

wherein said liquid crystal optical switch changes light intensities of the received spectral components for each wavelength and then sending them out for selectively changing the light intensities of specific wavelengths.

2. The dynamic gain equalizer according to claim 1, wherein said liquid crystal optical switch has a plurality of liquid crystal optical switch elements that are linearly arranged along the optical components separated by said spectroscope.

3. The dynamic gain equalizer according to claim 2, wherein said liquid crystal optical switch elements are arranged in two dimensions in the line direction and in a direction at a right angle to the line direction.

4. The dynamic gain equalizer according to claim 2 or 3, wherein said liquid crystal optical switch elements reflect and send out the light, whose light intensity is changed, into an incoming direction.

5. The dynamic gain equalizer according to claim 2 or 3, wherein said liquid crystal optical switch elements send out the light, whose light intensity is changed, into a direction different from an incoming direction.

6. The dynamic gain equalizer according to claim 4 or 5,

wherein said liquid crystal optical switch elements each have an optical element, which is composed of a liquid crystal cell and a light reflector, on any two sides that are at a right angle to a polarizing beam splitter and

a polarization direction of polarization components of said liquid crystal cell is controlled with another side of said polarizing beam splitter as an incoming end and an outgoing end of the light.

7. The dynamic gain equalizer according to claim 4 or 5,

wherein said liquid crystal optical switch elements each comprise a polarizing beam splitter, at least two light reflectors, and a liquid crystal cell that controls a polarization direction, and

said polarizing beam splitter and said light reflectors are arranged so that two polarization components, separated by the polarizing beam splitter, travel along the same optical path but into different traveling directions, re-enter the polarizing beam splitter, and are combined therein and, at the same time, said liquid crystal cell is arranged in the optical path to control the polarization direction of the polarization components though said liquid crystal cell.

8. The dynamic gain equalizer according to claim 6 or 7, wherein said liquid crystal cell controls an azimuthal angle of an incoming linearly polarized light in one of two angular positions, 0-degree rotation and 90-degree rotation, or in any angular position.

9. The dynamic gain equalizer according to one of claims 1-3, wherein said liquid crystal optical switch further comprises a photo detection element that detects a light intensity of a remaining light of an outgoing light which is sent out with the light intensity changed, and said photo detection element constitutes an optical spectrum analyzer that detects a light intensity complementary to the light intensity of the outgoing light for each wavelength.

10. The dynamic gain equalizer according to one of claims 6-8, wherein said liquid crystal optical switch elements have a photodiode array, which detects the light intensity, at one end of the outgoing end of the polarizing beam splitter, and the photodiode array constitutes an optical spectrum analyzer that detects a light intensity complementary to the light intensity of the outgoing light for each wavelength.

11. The dynamic gain equalizer according to claim 9 or 10, wherein said liquid crystal optical switch elements are controlled based on a detection output of said optical spectrum analyzer.